

# Psychological Bulletin

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RAYMOND DODGE, YALE UNIVERSITY (*Monographs*)

MADISON BENTLEY, UNIVERSITY OF ILLINOIS (*J. of Exp. Psych.*)

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# THE PSYCHOLOGICAL BULLETIN

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## SPECIAL ARTISTIC TALENT

BY NORMAN C. MEIER

*University of Iowa*

This review covers the literature since 1920 on creative artistic activity, related aspects of experimental æsthetics, and the measurement of appreciation and talent. A distinct paucity of experimental work marks the early part of this period and explains the absence of any systematic review since that of Pintner (31) which included also music, children's responses and general æsthetic theory. The survey of Jastrow (17) was general and theoretical in nature, while that of Bullough (3) went back to 1914 in order to include some of the earlier foundational work of Külpe, Binet, Dessoir, Karpinska, Bullough and Aveling and to present his own theory of æsthetic adaptation. Matsumoto (21) has outlined some of the psychological aspects in the development of a formative art. From these we may now turn to specific investigations.

### *I. The Quest for the "Creative Element" in Art.*

The halo of inscrutability which in the popular imagination surrounds artistic behavior has persisted in the scientific realm to challenge the best efforts of investigators. A considerable portion of the more serious work has been directed toward uncovering the mysteries of creative imagination, the creative mind, and the creative element in art. It is evident that there is ample textual material on the reproductive processes—images, imagery, memory, and imagination—but very little on production. The inherent difficulties in such investigation are pointed out by Bullough (4) and the conclusion

reached that æsthetic experience can be understood only through the intelligent and willing coöperation of the artists themselves and by analysis, experiment, observation, introspection, and research into the individual and social determinants. Kuhr (Copenhagen) (20) in a critical article offers the suggestion, proposed also by Dilthey, that since the artist is notoriously a poor introspectionist dependence for our analysis of artistic creation should be placed on the poet, who follows similar mental procedures in "inspiration" and reflection. More adequate knowledge may be obtained by systematic questioning, particularly regarding the manner in which the creative mind receive impressions, absorbs them and responds with strong emotional reactions. It should be the function of the psychologist to give interpretation and exposition to these basic thoughts.

The monograph of Paulsson (Stockholm) (30) is epochal in laboratory investigations of this kind, though his conclusions are less positive and significant than might be hoped for from such painstaking labors. The procedure consisted chiefly in presenting by means of the tachistoscope a series of inkblot and constructed object material (motifs) mostly in black and white but some in color. Refinement in method is indicated by his use of a pointed folded paper instead of pen or brush in order to eliminate personal style. These were presented to artistic and non-artistic subjects with instructions to draw, after brief exposure, those motifs which interested them. Detailed introspections were also taken. The conclusion reached is that artists and those engaged in related work drew more of the designs and gave evidence of far greater comprehension of them. The occupational bias and interest characterized both drawing and interpretation among the non-art subjects.

Psychoanalytic interpretations of creative effort have been offered by Walder (34) who places it on a basis of variations from the normal in experience, desire, and the ego-ideal, which results in thinking that is likewise a variant, and by Clark (6) who takes Leonardo da Vinci as an object of analysis. In this study Clark holds that alternation between two opposed principles of thought or modes of working produces a conflict which in normal persons would prevent either creative (synthetic) or scientific (analytic) achievement, but in da Vinci's case took the form of alternate desires. Other studies have been made by Heibling (13) who discusses form in the newer phases of art; by de Fursac and Minkowski (9); by Scheffer (32); and by Utitz (33). In a philosophical discussion Oppenheimer (29) attributes the impulse to create to personal satis-

faction and interest but adds that some audience, however small, is usually required. DeBoisbaudran (2) outlines the function of graphic memory and visualization in the training of the artist.

## II. *Experimental Aesthetics: Form and Color.*

An inquiry has been made experimentally into the constancy and objectivity of beauty by Gordon (11). Using 50 colored reproductions of fine rugs in two series (odds—evens) on cards, each series arranged in order of merit by three experts, she had 207 subjects rank them in order of æsthetic quality. The results, which held equally well for both sets, exhibited wide diversities among individual judgments but consistencies among groups. Correlations of individuals with groups tended to be positive but not high, the mean coefficients being .41 and .42. Granit (Helsingfors) (12) reports a study in the perception of form by persons of various age levels. Three types of figures were used: (a) drawn to resemble some familiar object, (b) simple figures with no direct resemblance to a familiar object, and (c) drawn without any plan. These were then presented by means of the tachistoscope, the subjects being required to draw what they saw, as a substitute for introspections. Age differences were shown in that the number of associations decreased with age. Children, he found, rarely perceive form as a *gestalt*; many of their associations have their source in some simple relation in connection with a characteristic detail. Chance frequently determines the construction. But with adults method enters. Elements are grouped around axes, or congruity is observed. These adult responses are assimilations of earlier experience, which in the child are lacking.

Feasey (8) conducted experiments with plain and colored rectangles and other geometrical forms with the aim of ascertaining if the basis of æsthetic judgment is emotional. The emotional reaction was measured by the psychogalvanic reflex. It was found that the golden section rectangle held a high place in preference but that this was not maintained when objectionably colored. From the arrangements of the geometrical forms into patterns of æsthetic value she discerned "pattern type" and "picture type" judgments when they were submitted to all subjects. No evidence could be found for any emotional basis of the judgments.

Color preferences have been investigated by Hirohashi (14); by Dorcus (7) who concludes that saturation and brightness are less important than hue in determining preference; by Imada (15) among

school children, finding the girls prefer, in order, R—G—V and boys B—Y—O. Adults, according to Miziguchi and Aoki (21) favor B and R, then G and Y, but this shifts to a stronger inclination for Y and G in the ages above forty. "Warm" and "cool" were subjected to experimental test by Mogensen and English (26) without, however, positive confirmation. This is possibly an instance in which the warmth or coolness of a color is intrinsic only to a setting normally associated with warmth or coolness, *e.g.*, as in the redness of a setting sun or the cold blue of ocean or snow expanse. The apparent "weight" of colors, on the other hand, was successfully determined by Monroe (27) who exposed patches of colored paper through holes or slits and required the subject to move a pointer until it bisected the line between the two. The location of the "fulcrum" was thus obtained. Here is clear evidence that dark colors are "heavier" than light and even R is "heavier" than G. Judgments of the midpoint of the line were biased toward the heavier color.

Hambidge (12) has produced a further exposition of dynamic symmetry, basing the discussion largely upon plant structure and the elements of the human figure. He has an able interpreter and co-worker in Jacobs (16) whose detailed graphic analyses of paintings give additional clarity to the principles. Berliner (1) makes use of Japanese material in a related discussion and Whitmore (35) contributes one of more general interest.

### III. *The Measurement of Appreciation and Talent.*

Test devices for art appreciation and as aids in talent prognosis are difficult of construction and dependent upon a number of unsettled considerations. This has not deterred investigators from going ahead with the development of techniques on the assumption that if they are statistically and functionally valid the other considerations may be settled in the course of development.

Jones (19) concluded from a questionnaire sent to 200 artists that the artist type is a good visualizer, is adept in making fine discriminations and perceptions, that he reasons logically, and is capable of accurate motor adjustments. On this basis he had a cartoon presented to Evanston school children for each one to copy; also two drawings from life. This was supplemented by group tests for visual memory and for perception of perspective. These were then scored and comparisons made. Visual memory was correlated with



drawing ability  $.83 \pm 3.2$ . Perception of perspective was correlated with drawing ability  $.69 \pm 5$  and perception of perspective with visual memory  $.83 \pm 7.2$ .

Christensen and Karwoski (5,20) tried three methods. The most satisfactory required a comparison of two examples of art (e.g., a Chase portrait *versus* a photograph). In addition one of five reasons was chosen in which one only was right, the other four being wrong, not applying, or failing to bring out the most important point. The second method consisted in judging a single picture as good or not good and checking reason (five suggested). The third method required a selection of the best from four examples of similar subjects. The materials were from paintings, architecture, sculpture, industrial art, color and abstract design. The subjects were divided into four classes; untrained, general art students, advanced art students, and art instructors. The results show some overlapping in all groups but distinct separation of modal points in the direction of most training.

Meier (22, 23, 24), after study of the methods of masters centered attention upon æsthetic sensitivity as the critical variable in the art-talent complex. In order to have a standard which would admit of least difference of opinion the works of recognized artists were selected as test material. The constant in art was assumed to be the general principles or qualities of balance, harmony, rhythm and their variations. The art work was copied in two variations, one like the original, the other with some element altered so as to destroy the balance, rhythm or unity. Left-right responses were secured with merely a printed statement of what was altered. The distribution of scores shows overlapping in all classes and an upward trend toward art faculty but these high scores were attained also by some untrained, suggesting (in some cases this has been verified later) latent talent.

Newcomb (28) presents a survey of beauty appreciation in school children. Two thousand were included, the study being based upon composition and designed to measure receptivity to beauty and æsthetic attention span. Only general results are reported.

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## STUDIES IN THE PSYCHOLOGY OF CHILDREN'S DRAWINGS

BY FLORENCE L. GOODENOUGH

*Institute of Child Welfare, University of Minnesota*

Psychological interest in children's drawings may be said to date from the work of Cooke (20) in 1885, and that of Ricci (87) in 1887. Since the greater number of the early articles on this subject are of a simple descriptive character and involve much essential duplication of material, only the more significant of those appearing previous to 1915 will be mentioned in this paper. For further references the reader is referred to the bibliographies compiled by Ayer (4), Burkhardt (14), Eng (26), Goodenough (28), Ruttman (90), and Rouma (89).

In 1893 Earl Barnes (8) published an article on children's drawings based upon an analysis of the attempts of several hundred school children to illustrate the poem "Johnny Look-in-the-air." In this article, attention is called to the developmental changes shown in the drawings made by children of different ages. The drawings were also tabulated with reference to subject. The proportion of children who selected for illustration each of the various incidents described in the poem is reported, and the possibilities of the method as a guide to the study of children's interests are discussed. This and subsequent articles by Barnes attracted much attention both in this country and abroad, and served as the stimulus for a number of similar studies elsewhere.

Since the beginning of the present century, children's drawings have furnished material for many different types of psychological investigation. It was soon recognized that drawing, as it is done by the young child, is a very different psychological performance from drawing as the adult usually conceives it. This difference is admirably expressed by the frequently quoted statement that "the child draws what he knows, rather than what he sees." The truth of this statement has been established through repeated experimentation. Kerschensteiner (44) found that the drawings of little children are relatively little affected by the presence or absence of a model.

Children accustomed to drawing the human figure in the full-face position continue to do so when a model is placed before them in profile, and as a rule seem quite unaware of any discrepancy in the results. Clark (18) had several hundred school children draw an apple with a hatpin run through it. The hatpin entered the apple on the side turned toward the children and emerged on the side turned away from them. To none of the children could it be seen as entering or leaving exactly at the edge. When the drawings were examined, however, it was found that the younger school children, in practically all instances, had drawn the hatpin extending straight through the apple and visible throughout its length. In drawings made by children who were somewhat older, the pin stopped at the outline of the apple on one side and began again at a roughly corresponding point on the other side. These children had apparently learned that the opacity of the apple would make the portion of the hatpin which was within it invisible, and had embodied this idea in their drawings, but were otherwise uninfluenced by the appearance of the model. Only in the upper grades was it found that the presence of the model had served any other purpose than that of giving the cue for the idea; given the idea, the nature of the drawing was no longer dependent upon the appearance of the model.

This characteristic of children's drawings has suggested to many persons the possibility of utilizing such material in the study of mental development during the early years. Most of the reports of the development of individual children, especially those kept by psychologists, include an account of the drawings made by the child at various ages. The monograph by Brown (12) includes four of the earliest of these; the Scupins (93, 94) describe the drawings made by their child up to the age of six years; Stern includes a chapter on the early drawings made by his children in his book on the psychology of early childhood (99) and together with his wife has published a much more complete account of the drawings made by one of the children up to the age of seven (97). Luquet (54) preserved every drawing made by his little daughter, no matter how crude, from the time when she first began to draw at the age of three years and three months up to the age of eight and a half years. During this time great care was taken to keep the drawings free, not only from adult influence, but also from the influence of other children. Each drawing was numbered and dated, the circumstances under which it was drawn were noted, together with a record of any comments made by the child at the time of drawing. The

completeness of the series and the care exercised with regard to its collection renders Luquet's study one of particular value. The most recent study of this kind is that by Eng (26), which is based upon the drawings made by her little niece, beginning with the first simple strokes which were made at the age of ten months, and continuing up to the age of eight years. The first part of the study deals with general developmental features as shown by a comparison of the drawings made during each successive year of life. The second part deals with certain special aspects of the drawings, such as perspective, sense of proportion, expression of movement, color, and ornamentation. The third part of the study is given up to a comparison of children's drawings with those made by primitive man. Frequent comparisons with the findings of other investigators are made throughout the monograph, and the psychological significance of the various developmental steps is clearly pointed out. Eng shows that in many respects at least, the developmental process is in line with the viewpoints of the Gestalt school. She stresses particularly the many possibilities which these drawings hold for fundamental studies of psychological theory, particularly in the field of perception.

A second approach to the study of mental development as indicated in children's drawings, has been made through statistical treatment of the performances of children of different ages. Partridge's study (82) of children's drawings of the human figure is one of the earliest of these. Ivanoff (40) classified the drawings of several hundred children of four Swiss cantons according to a six point scale, and computed the correlations between his results and standing in the various school subjects, teacher's ratings on general ability, and on certain social and moral traits. He found a positive correlation in practically all instances. Goodenough (28, 29) has developed a more comprehensive scale for the measurement of the intellectual factor in children's drawings and has reported the results of its use with over five thousand kindergarten and primary-grade children. Gesell (27) includes several drawing tests, ranging in difficulty from single strokes to the drawing of a recognizable "man" in his series of tests for children of preschool age. Cyril Burt (15) presents a scale for the measurement of drawing ability in his book on mental and scholastic tests, and devotes a considerable amount of space to a discussion of the intellectual factors involved in this type of performance. He stresses particularly the significance of the "qualitative" differences between the drawings of normal and backward

children. A number of similar studies of the developmental steps shown in the drawings made by children of different ages, but without formal statistical treatment, have appeared in the literature from time to time; among which the work of Sully (101) and of Rouma (89) should be particularly mentioned.

One of the earliest attempts at the construction of a purely objective scale of achievement in any field was made by Schuyten (92) in his study of the drawings of Antwerp school children. He used the human figure as the subject. The children were told to draw a man "in whatever way they were accustomed to draw it." By means of very minute and careful measurements of the relative proportions of the various parts of the drawings and comparison with classic standards, Schuyten hoped to be able to establish a standard of excellence for each age, or, in other words, a series of age-norms. While the plan was not successful, the idea is worthy of note, since it constitutes one of the earliest attempts to utilize age-standards in the field of educational measurement. The Thorndike scale for the measurement of drawing achievement (102) has been extended and supplemented by Childs (17), Kline and Carey (46), and most recently by McCarty (67), all of whom have followed the plan of scale construction used by Thorndike, which is based upon the theorem advanced by Fullerton and Cattell that "differences equally often noticed are equal."

Since the pioneer work of Cooke (20) many workers in the field of educational psychology have urged that art instruction in the schools be made to conform more nearly to the mentality and interests of the children, and several experimental studies have been undertaken with view to accomplishing this purpose. The most significant of these is unquestionably that carried out by Kerschensteiner (44) who was given the task of reorganizing the course of instruction in drawing for the folk-schools of Munich. In order to establish a scientific basis for his work, he first collected almost 100,000 drawings made under carefully standardized conditions by the school children of Munich and the surrounding villages. All these drawings were studied and classified, and the results subjected to statistical treatment. Three main classes of drawings were noted, as well as certain intermediate types. These may be indicated as follows: (1) purely schematic drawings in which the child is influenced chiefly by his knowledge of the object rather than by its appearance; (2) drawings made in an attempt to reproduce the visual appearance of the object but in two dimensions only; and (3) those in which an attempt is



made to give an idea of three-dimensional space. The psychological significance of the three types is discussed at length, and many tables showing age, grade, and sex differences are presented. Kerschensteiner found that according to this classification the boys greatly excelled the girls at all ages and in all types of drawing except in certain forms of decorative design in which the girls did better than the boys.

Studies in the educational psychology of drawing have also been made by Ayer (4, 5), Cohen (19), Manuel (72), Meumann (74), Peter (84), and by Wood (110) who points out the possibilities in the use of primitive art in the teaching of young children. Truemper-Boedemann (103) discusses the use of drawing in the teaching of the feeble-minded; Lindner (51, 52) and Matz (73) have compared the drawings made by deaf with those of hearing children using the method developed by Kerschensteiner. Both find evidence of compensatory mechanism; the deaf children in general doing better work in drawing than those having normal hearing. Muth (76, 77, 78, 79) has published several studies on children's work in decorative design, and Neubauer (80) used drawing as one phase of a study of constructive ability in young children.

The origin and nature of special talent in drawing has been made the subject of several interesting investigations. Kerschensteiner (44) devotes a chapter of his book to an account of the drawings made by three specially gifted boys. These children, together with ten others of similar ability were later studied by Kik (45). In his study Kik differentiates between real creative ability in art and mere ability to copy. He shows that the children in his group who belonged to the former class as a rule excelled also in other forms of ability, but this was not true of the copyists. More recent studies of drawing talent have been made by Hartlaub (35), and by Manuel (72), the latter of whom used standardized tests in an attempt to develop a means for selecting children capable of profiting by special instruction in drawing. Hollingworth (36, 37, 38) considers that drawing ability bears little relationship to other forms of ability. She presents no figures, but cites individual cases in which the ability in drawing appears to be greatly at variance with ability along other lines.

The possibility of utilizing children's drawings as an index to their interest was first noted by Barnes (8). Following his suggestion Maitland (70) made a tabulation of the subjects chosen for drawing by children who were told to draw whatever they wished. Similar



studies have been made by Ballard (6, 7), Katzaroff (43) and a recent and very extensive study by McCarty (67). McDermott (68) has reported a similar piece of work done with Indian children. In spite of the fact that these studies embrace a time period of more than a quarter of a century, and that the subjects were of four different nationalities (American, English, French and Indian), the general similarity of the results is indeed striking, and suggests the presence of certain fundamental underlying factors.

Children's drawings have also been utilized in a number of genetic studies in the field of perception. The study by Clark (18) has already been described. Albien (1) carried out a very carefully controlled experiment on the ability of children to reproduce unfamiliar geometrical forms. He found that directed observation and analysis, followed by a perception and assimilation of many partial elements into a unified whole are the primary essentials in the ability to reproduce the figure. Paulsson (83) carried out a somewhat similar experiment with adult subjects, using inkblots as stimuli. He found that the only blots reproduced were those which suggested a meaning of some kind to the subjects. The curious ideas of spatial relationships shown in children's drawings have been noted by many investigators, and have been made the subject of special studies by Burkhardt (14), Crammussel (21), Eng (26), Jaensch (41), Segirs (95), and Volkelt (107).

Two further types of investigation remain to be mentioned. The first has to do with drawings made by the insane. A number of such studies made with adult patients have appeared in the literature from time to time. Prinzhorn (85) in a very extensive study of this kind has shown that not only do the drawings made by patients in hospitals for mental diseases differ in many important respects from those made by normal individuals, but that those made by patients suffering from different classes of mental disease show characteristic differences from each other. He stresses in particular the infantile characteristics of the drawings made by schizophrenic patients, in whom the progress of the disease is marked by general mental deterioration. The drawings made by a psychopathic child have been described by Rouma (88). Goodenough (28) has suggested that if properly understood, the drawings made by children might furnish considerable aid in the early diagnosis of personality disorders and mental maladjustments.

The last group of studies to be considered are those dealing with the relationship between the drawings of modern children and

those of prehistoric man or modern primitive races. During the period when the discussion over the theory of recapitulation was at its height the number of publications on this subject was very great, and only a few of the most important of them can be mentioned here. Through the efforts of Lamprecht there was assembled at Leipzig what is probably the most extensive collection of children's drawings ever collected. A request for such drawings was sent out to all countries of the world, and met with a most enthusiastic response. The number of drawings received was so great that up to the present time no adequate treatment of the material has been possible. Levenstein (50) who collaborated with Lamprecht has published a summary of a small part of the material in which he compares the drawings made by European children with those of certain primitive tribes. Degallier (23) describes the drawings made by Congo negro children; Probst (86) those of the children of an Algerian tribe which had not been subjected to European influence; Haddon (34) those made by natives of British New Guinea; Maitland (69) has a report on the drawings of Eskimo children. Comparisons between the drawings of prehistoric man and those of modern children have been made by Doehlemann (24), Van Gennep (104), Verworn (105, 106), Kretschmar (47, 48), Rouma (89), Luquet (53, 58, 61, 62, 63, 64, 65), Eng (26) and others. Certain resemblances are shown to be very apparent. Both in children's drawings and in those made by primitive man there is a tendency to utilize a common scheme for the representation of objects which actually have but little in common. Luquet (53) points out that the animal drawings of little children consist essentially of the same scheme as that used for the human figure, placed in a horizontal instead of a vertical position, while the drawings of the human figure made by paleolithic man (whose drawings are chiefly of animals) consist essentially of the animal scheme placed in a vertical position. Children and primitive man make use of very similar devices for the representation of space; both make plentiful use of symbols for the representation of things not actually shown in the drawing and neither have any hesitation in representing the invisible as if it were visible (Luquet) (65). Rouma (89) on the other hand believes that the resemblances between child art and primitive art are more apparent than real. He points out the many sources of error in making comparisons between drawings done under such widely disparate conditions of opportunity and training and by the use of such different materials, and objects to the tacit assumption that the prehistoric drawings which have chanced to be preserved

may be regarded as representative samples of the art of their particular period. Verworn (105, 106) shows that the drawings of paleolithic man are highly physioplastic in type; that is, they represent an attempt to depict objects according to their actual appearance, while those of the bronze age and the iron age are in general ideoplastic (schematic, idealistic, or ornamental). He ascribes this to the gradual transition from a purely materialistic culture-stage to one which was dominated by a more idealistic viewpoint, and particularly to the development of primitive religious ideas. He points out that the order of development in children's drawings is the reverse of that found in the race; i.e., from ideoplastic to physioplastic while prehistoric man passed from the physioplastic to the ideoplastic stage. He objects, therefore, to the idea that child art can throw much light upon cultural development in the race, and agrees with Rouma in feeling that in spite of certain superficial resemblances, the underlying developmental factors are not necessarily similar.

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## TESTS AND MEASUREMENTS IN MUSIC

BY JACOB KWALWASSER

*Syracuse University*

Musical aptitudes, musical accomplishment, and as a matter of fact, musical appreciation have submitted to objective measurement to a degree that is almost incredible. A vast array of music tests have been devised, most of which have been standardized by means of accepted statistical methods. So significant have been the findings based upon scientifically constructed tests that revolutionary changes in music pedagogy, vocational guidance, and musical attainments are assured. In order to facilitate the discussion of tests in music, the writer deems it advisable to classify tests by types, and to further arrange them into categories into which they naturally fall.

### APTITUDE TESTS

Révész<sup>1</sup> made an analysis of musical talent and devised a number of tests which were called: (1) rhythmic sense, (2) absolute pitch, (3) octave recognition, (4) relative pitch, (5) harmonic sense, (6) melodic memory, and (7) playing by ear. These tests were rather crude devices. They were not accompanied by norms and were not intended for large group measurement. His tests, however, are based upon an empirical procedure and involved an analysis of what constitutes some of the important characteristics of musicianship.

#### A. SENSORY TESTS

1. The outstanding leader in the field of aptitude testing is Dean Carl E. Seashore, Dean of the Graduate College of the University of Iowa. He and his colleagues in the psychological laboratories have constructed a number of psychological tests which are now issued by the Columbia Phonograph Company in record form for the purpose of group and individual testing. These six tests are known as "Measures of Musical Talent." (22) These tests may be used for diagnostic and prognostic purposes. They are based upon an analysis of sensory equipment indispensable for musicianship. Prob-

<sup>1</sup> Révész, G., Prüfung der Musikalität. *Zsch. f. Psychol.*, 1920, 85.

ably one of the most important of the "Measures of Musical Talent" is the Sense of Pitch Test, measuring pitch discrimination in terms of the least perceptible difference in pitch that the subject can detect. It consists of 100 trials which range in difficulty from 30 vibrations to one-half vibration interval; or from an interval greater than a half-step to one smaller than  $1/100$  of a scale step. The pitches are produced by means of tuning forks amplified by Helmholtz resonators. Thus it is possible to measure objectively differences in one's capacity to discriminate tones, an elemental capacity that is basic in music and without which none may aspire to achieve distinction in the realm of music (24).

2. *Intensity Discrimination*.—The sense of intensity is measured in terms of the least perceptible difference in the strength or loudness of sounds that the subject can detect. The subject is instructed to listen to paired sounds and judge whether the second sound is weaker or stronger than the first. The test consists of 100 trials covering a wide range of intensity differences produced by an instrument known as the audiometer. Again, a single factor is measured under rigid control and the scores made reveal one's intensity discrimination.

3. *Time Discrimination*.—A third "Measure of Musical Talent" the Sense of Time Test measures the least perceptible difference in time that the subject can hear. The observer is instructed to judge whether the second time interval is longer or shorter than the first. This test also is composed of 100 trials, involving discrimination of time intervals varying from 1.00 to 1.20 seconds. Clicks are used to mark off the paired time intervals.

4. *Consonance Discrimination*.—In the Sense of Consonance Test, the subject is instructed to judge whether the second pair of tones heard is better or worse than the first pair, on the basis of three criteria; namely, smoothness, blending and purity. The test is made up of 25 items which are repeated in inverse order, making a total of 50.

5. *Tonal Memory*.—The Tonal Memory Test measures one's memory span for melodically unrelated tones. It is composed of 50 trials representing 5 degrees of difficulty. The first 10 trials present two-tone patterns; the following ten, three-tone patterns, etc. Every tonal pattern is repeated and in the repetition one of the tones is changed. The subject is asked to identify the changed tone. The last 10 trials are made up of six-tone patterns. This test measures

a most indispensable capacity conditioning success in music and is not related to any other type of memory.

6. *Rhythmic Discrimination*.—The Last of the Measures of Musical Talent appeared only a few years ago and is called the Sense of Rhythm Test. It measures one's capacity to detect differences in paired rhythmic patterns on the basis of two variables, time or intensity or both. Fifty items constitute the test which increases in difficulty from beginning to end. The subject is asked to judge whether the paired rhythmic patterns are the same or different. Tone has been eliminated from the test and the elements of rhythm only are embodied in the test and varied under control.

These six tests represent years of thorough study and experimentation and while they are not free from imperfections and shortcomings, they nevertheless measure basic psychological capacities with a high degree of reliability. With the exception of memory and rhythm the tests have no significant inter-correlation and the correlation between these two tests is only .49, which reveals that the rhythm test involves some of the traits measured by the memory test. The most important one, probably, is memory—memory for rhythms.

But before introducing the general characteristics of aptitude tests, the writer desires to add other sensory tests constructed by Schoen (19).

*Relative Pitch*.—The relative pitch test requires the subject to make a judgment as to the relative distance between two sequential pitch intervals which differ in size. The subject must judge whether the second interval is larger or smaller than the first. The test consists of 100 paired intervals, grouped into 10 series of 10 pairs each. The first 60 trials are arranged in order of progressive difficulty. The purpose of the test is to measure the accuracy with which the subject can hear differences in distances between intervals.

*Rhythms*.—Another test devised by Schoen consists of 25 pairs of rhythmic phrases each of which contains two fairly distinct patterns. The second phrase of each pair is like the first phrase, with the exception of a slight change occurring in the duration of one of the constituent tones of the first or second pattern, without, however, destroying the rhythmic continuity of the phrase. The rhythms are arranged in order of progressive difficulty and the subject is called upon to judge whether the second phrase is the same as or different from the first, and if different, whether the change occurs in the first or second patterns of the repeated phrase.



## B. FEELING TESTS

1. *Melodic Sensitivity and Harmonic Sensitivity.*—One of two feeling tests constructed by the writer for the purpose of evaluating the basic affective responses upon which an appreciative attitude toward music is established. The test consists of 35 two-measure melodic fragments, and attempts to measure one's ability to distinguish the good melodic progressions from the bad. The items are arranged in chance order as to merit, and increase in difficulty of discrimination from beginning to end.

2. *Harmonic Sensitivity.*—Another feeling test constructed by the writer for the purpose of measuring one's ability to discriminate between good and poor harmonic progressions. There are 35 three-chord progressions in the test (half of which are good and the remaining half are poor) arranged in chance order as to merit and increasing in difficulty from beginning to end.

In both the Harmonic and Melodic Sensitivity Tests the quality of the progressions is determined by established procedure in musical composition. Progressions that obey established melodic and harmonic law are adjudged as good, while those that violate established procedure are adjudged as bad. The tests are issued in record form by the Victor Talking Machine Co., catalogue number 35773. Tentative norms have been computed for both tests.

3. *Tonal Sequence.*—Another test of the feeling type was devised by Schoen (19) for the purpose of revealing the individual's sensitivity for the fitness of tones in a melody. Schoen defines melody as a "succession of tones differing from each other in pitch and duration and giving the effect of an aesthetic unity. A musically good melody creates a complete impression, just as does a properly constructed sentence. Unity is the primary requisite of a good melody. This fitness of tones in a melody is a trait that makes its appearance in the musical child long before he receives any training or is conscious of any rules governing the construction of melodies." The test consists of 16 alternate terminal phrases and 4 original antecedent phrases. Of the 16 terminal phrases, four are original. The subject is instructed to assign to the 4 terminal phrases one of 4 values: zero for the poorest, 6 for the best (original phrase) and 2 and 4 for the others. The test is not yet recorded and must therefore be played on the piano by the experimenter.

## C. MOTOR TESTS

Musical manipulation is more or less the result of special training, yet it is possible to measure the motor capacities of an individual before musical training is begun. Persons differ in their natural powers of action as they do in their sensory equipment, and it is important to discover one's motor fitness for musical study.

1. *The Tapping Test: A Measure of Motility.*—The tapping or motility test has long been used by psychologists for measuring the speed and regularity with which a repeated movement can be made. A great variety of motility tests are to be found, but the test which the author has found most useful is the one standardized by Ream.(16) The apparatus required for the giving of the test consists of a telegraph key, two dry cells, a metronome with mercury cup and contacts, a Veeder counter and some electric wiring. The subject is instructed to tap as fast as he can for a period of five consecutive seconds, holding the key with thumb and finger. Preliminary practice is permitted so as to familiarize the subject with the working of the key. The number of taps that the subject makes during the five second period is recorded by the Veeder counter. Twenty five-second trials constitutes the test.

Ream reports that unlimited practice in motility does not increase one's speed of tapping to any extent, although it does increase the regularity of tapping. In fact, the amount of gain in either speed or regularity is very insignificant. Where gain was recorded, it was usually attributable to improved technique, but where no improvement was noted, the subject developed good technique the first day and was regular in his performance thereafter. Individuals range in motility rate from 20 to 60 taps for the five-second period.

2. *Reaction Time.*—"Simple reaction time is the time that it takes to make a simple response to a simple stimulus. Signals may be of thousands of varieties and so may also the responses; but as in motility, it is possible to select some typical signals with simplest possible responses, both of which can be well controlled for the purpose of measurement. Reaction time experiments may be divided into two large groups; first, simple reaction which is the barest sensation-movement response, and second, complex reaction involving some form of higher mental process."(24)

A reaction time test employing a spark-chronoscope is described



by Seashore.<sup>2</sup> The subject hears a sound signal through a telephone receiver and responds by the simplest finger movement. The time between the signal and the response is measured in hundredths or thousandths of a second. Again the results reveal two factors; speed and regularity. Records in terms of these two factors become striking pictures of personal equation. We find individuals who are extremely quick, reliable and uniform in their responses; on the other hand, we find individuals who are extremely slow and erratic.

There are a number of other motor tests but their application to music is rather remote. Seashore has devised a precision of movement measurement, an eye and hand coördination test, etc., but they have not been standardized and their value and meaning are yet to be established.

The enumeration of aptitude tests in music has now been completed and a discussion of the salient characteristics of all of these tests seems apropos. These tests measure elemental capacities. They measure innate capacities which constitute one's musical heritage—one's musicianship. They measure objectively the amount of talent an individual possesses. They show no significant correlation with sex, age, training or intelligence. Neither do they correlate with one another to any extent. They measure many specific capacities, which when combined with many other factors, constitute musicianship. It must not be assumed that all musical capacities have been adequately measured, for many capacities are at present either poorly measured or have not yet been measured at all.

By actual experimentation it has been demonstrated that training cannot improve one's musical endowment. One's sense of pitch for example cannot improve by hearing or studying music, any more than one's sight can be improved by looking at colors. The keenness of the sense of hearing is determined by psycho-physical structures which condition and control this function. We must realize that defective hearing is due chiefly to imperfections in the structure and function of the ear. "The sense of pitch cannot be improved appreciably by practice. There is no evidence of any improvement in sensitiveness to pitch as a result of practice. When a person shows a cognitive threshold, practice ordinarily results in a clearing up of difficulties, in the way of observations, development of interest, isolation of the problem and more consistent application to the task

<sup>2</sup> New Psychological Apparatus, C. E. Seashore, *University of Iowa Studies in Psychology*, 1899, 2.

in hand. This is, of course, not improvement of the psycho-physical ear, but merely a preliminary to a fair determination of the psycho-physical limit." (25)

Klauer (7) undertook to study the effects of training upon the sense of rhythm. The Seashore Rhythm Test was given to 75 children in grades four, five and six, after which three months of very intensive drill in rhythm was conducted.

Such exercises as marching to music, beating time by swinging the arms synchronously with the beat, breathing in such a way as to maintain a concurrence between beats and the inhalation of breath, clapping the hands so as to give the children tactual, kinaesthetic, auditory and visual experience, tapping out some of the actual rhythms found in the rhythm test, rhythmic exercises in discrimination, and many other devices were used in an attempt to give the children as rich an experience in rhythm as could be afforded and to improve their rhythm scores on the Seashore test. After 3 months of such training the children were tested again and showed a very slight gain.

Seventy-five children of the intermediate grades in another school were tested twice in a period of three days without any intervening rhythmic training in order to ascertain the maximal effect of improvement due to the repetition of the test alone. The gain made in this case was greater than that made by the former group with training. Miss Klauer concludes that "this capacity is relatively fixed. The children remained substantially where they were in spite of the intensive drill to which they were subjected. In this sense as in the other basic music senses, the music educator must be cognizant of the extent and magnitude of individual differences. Furthermore, the teacher must know definitely the amount of the capacity possessed by each child and should devise a program of procedure that will make it possible for every child to realize all that he can on his rhythmic endowment."

In order to ascertain the influence of past training on the sense of rhythm, De Graff (3) measured 464 university sophomores, many of whom had had musical training. Each student was asked to record the number of half-hour lessons that he had received in music. The scores of the trained and untrained on the Seashore Rhythm Test were then correlated with the amount of training, in an attempt to show statistically the influence of music training on the rhythm scores. The mean score for the trained was found to be 75.50 while the untrained mean was 75.51, which gives the trained group

no advantage. It may be seen that the sense of rhythm is innate. Those who possess it may use it in their musical activities, while those who are devoid of any great amount of it cannot acquire it by training. De Graff found the correlation coefficient between rhythmic discrimination scores and training to be only  $+.09$  with a probable error of  $\pm .04$ . Obviously there is no significant relationship between the two factors.

What is true of pitch and rhythm is true likewise of the other sensory tests. Training is incapable of giving one more talent; it merely utilizes the talent that an individual possesses. Nor will training eradicate innate musical differences. On the contrary, training is likely to magnify these differences.

Some think that musical talent is conditioned by age, but we are not justified in believing that age is either a help or a hindrance. In discussing the subject of pitch discrimination and age, Smith (25) writes: "The question of variation with age may be interpreted to mean that we have no evidence of improvement in the physiological limit of pitch discrimination with age; a young child of school age and even younger can hear pitch fully as keenly as an adult. The amount in favor of the adult shown in all statistics is amply accounted for by the difficulty of making a reliable test on the young and their lack of information."

While it is true that Seashore tests are issued with three age norms, this was done with the object of factoring out differences in attentional and informational matters which would otherwise reward the older and penalize the younger children. Some of these factors are, better control of attention, increased power of application, better understanding of instructions, and better adaptation for sustained effort. Younger children are not inferior to older ones in their spontaneous perception of sense differences, but the younger children may be inferior to the older in their mental habits. These matters, external to those of discrimination, require equalization, and therefore the three age norms.

From the fact that most of our orchestra players, conductors, composers and virtuoso musicians are men, we might be misled in believing that men are more musically endowed than women, but such is not the case. In the records of Smith (25) we find that "pitch discrimination does not vary with sex to any extent. In many hundreds of tests in this laboratory in which comparisons have been made for sex, certain tendencies are shown in group records, sometimes in favor of one sex and at other times in favor of the

other sex, but on the whole, it seems certain that such differences, except so far as they are due to grouping, may be accounted for as due to the conditions of the test rather than sex differences in the psycho-physical capacity of pitch discrimination. Thus one of the most consistent and striking differences reported, that of the superiority of the elementary schoolgirls over elementary schoolboys may be fully accounted for by the prevailing trait of aloofness of the pre-adolescent boy toward music. These boys often regard music as a sort of frill for girls, and, therefore, enter the test with less fervor than do the girls. Such interpretation is supported in part by the fact that in high school and university, where girls have had far more advantage of training than boys, the records reveal no appreciable difference for sex."

When standardizing the rhythm test, De Graff(3) found no sex-linked difference in scores. For the sixth grade boys and girls both averaged 69.00. In the eighth grade boys averaged 69.78 and girls 69.47; adult scores for males are given as 74.12 and females 73.81. These median scores are approximately the same and reveal the sexes to be about equally endowed rhythmically.

Musical aptitude tests are not intelligence tests and reveal nothing as to one's mentality. In an unpublished study of the writer the following correlations with mental age were found; Pitch .20; Intensity .25; Time .21; Consonance .01; Memory .02; Rhythm .01. These are all positive correlations of a low order. They are based upon 300 cases of wide age range and agree rather closely with the results of other investigators.

Reports of the relationship existing between performance and aptitude scores are somewhat conflicting. Probably the most extensive study made of this relationship is the investigation carried on at University of Rochester by Stanton.(27) The investigation covered a period of four years and involved a few thousand students. It reveals how closely aptitude test scores approximate the grades given subsequently by teachers of music. On the strength of the evidence submitted by Stanton to the faculty of the Eastman School of Music, the Measures of Musical Talent were adopted for the purpose of culling out those applicants to the school, whose capacity was found upon examination to be deficient, since it was unlikely that these applicants would either remain in the school or do satisfactory work after gaining admittance.

But unfortunately other studies do not confirm these results. Mosher (15) computed the raw correlations between the Measures



of Musical Talent and his own sight-singing achievement scores and found the coefficients markedly low. "Assuming that the Seashore Tests measure native capacity, the data show, first, that measures of native capacity do not predict success in singing; second, that the recognition of the limits of capacity for individuals might aid in defining the possible ultimate achievement in sight-singing; third, that if the Seashore tests are considered accurate estimates of musical capacity, a number of pupils fall far short of what they are innately capable of doing. Likewise one might say that those of mediocre talent are achieving more, in terms of their endowment, than are those of superior ability. A similar situation undoubtedly exists in many other subjects. Often the duller pupils exert themselves more than do the superior, the former obtaining higher marks than one would expect in view of their native capacity."

Brennan (1) made a study of 24 selected music students in 12 different capacities and compared their ratings in these capacities with their actual performance abilities. The average correlations found between the "pooled" innate capacity tests and performance as measured by musically trained critics and psychologists were .32 and .25 respectively. Brennan found a higher correlation between training and performance than between sensory capacity and performance.

In a recent study Lenoire (14) measured 200 colored and 200 white fifth grade children in a nationally prominent school system for the purpose of ascertaining the influence of race on musical aptitudes. A number of astonishing results were revealed. He found the negro child was far superior to the white in rhythm and tonal memory and not inferior in any of the other capacities. The colored child averaged 65.69 in rhythm whereas the white child averaged 61.48—a significant difference. Whether the negro maintains his superiority in rhythm and tonal memory in subsequent grades is a matter of speculation, for no scientific study has been made of the problem in the upper grades.

#### ACHIEVEMENT TESTING

Achievement testing may be divided into three groups; namely, knowledge, appreciation and performance. None of these groups have been exhaustively measured by tests now available, but with the growing interest in tests we may expect a number of new and needed tests. All achievement tests are pedagogical tests. The



more training one receives in music the more one should earn on achievement tests. Theoretically this is true but tests often reveal that teaching and learning are not reciprocal terms. With the exception of sight-singing tests all are group tests, for which age or grade norms have been or may easily be computed. In a definite way scores earned on achievement tests correlate with age, sex and intelligence.

The reader may not realize the need for both aptitude and achievement tests in music, but the need is nevertheless a real one, for neither type alone gives us a complete picture of one's musicianship. The aptitude tests must be looked upon as giving us a measure of one's musical promise. The achievement tests give us a record of what one does with his native capacity. We frequently find individuals who are superior in capacity but inferior in achievement, and conversely, individuals who are only average in capacity but superior in accomplishment. These apparent antitheses may be very easily explained. An individual of superior endowment may attain very little in music if he lacks interest and the will to succeed. If such an individual has a low grade mentality it is unlikely that he will achieve distinction in the realm of music. Poor instruction, indifferent work habits and the like retard the progress of the most talented. We need both types of tests so that we may better understand the individual and his problems.

And while the writer considers both types of testing indispensable, he has found that accomplishment tests have already made a most important contribution to music education. They have been used in our public schools with significant results. They have revealed conditions in our schools that have hindered and devitalized music education. They have not only revealed weaknesses in our procedure but they are being used to refine and modernize music pedagogy. They promise to standardize music and improve its administration.

Recently a survey was made of a number of very prominent schools. A number of exceedingly interesting facts were revealed. Some 4,177 children ranging in grades from four to twelve were given the Kwalwasser-Ruch Test of Musical Accomplishment. The grades of boys and girls were separated by grades and averaged. It was found that the girls were consistently above the boys throughout the entire range of grades. The average difference in total scores between consecutive grades from four to eight is 14.75 as revealed by the norms. The average differences between girls' and

boys' scores in these grades was found to be 16.04, so it is seen that the girls are more than a grade in advance of the boys.

A few years ago the author made a study in which the Kwalwasser-Ruch Musical Achievement and the Stanford Achievement Tests were used for the purpose of finding correlations between mental age and school scores. Three hundred children were used in the investigation. Mental age correlated .80 with composite score; .71 with arithmetic; .60 with music; .56 with spelling and .53 with language. It must be remembered that the music test is a knowledge test primarily and that a moderately high correlation with mental age might be expected.

The only other musical achievement test correlation with intelligence that has come to the attention of the writer is reported by Mosher (15). His coefficient is exactly the same as the one reported above, although the two tests were conducted with different children and materials. The Bureau of Research of Washington, D. C., school system supplied intelligence ratings of the children of that city. In most cases the children had been given two intelligence tests. Since the I.Q.'s were available with chronological ages, the two I.Q.'s were averaged and multiplied by the chronological age in order to get the mental ages. There were 406 intelligence records and these were correlated with the scores earned on the Mosher Group Test, the calculation resulting in a correlation coefficient of .6009. It must be admitted that intelligence plays a meaningful part in musical knowledge scores.

Musical performance and intelligence, on the contrary, show very little correlation. Mosher found the coefficient between individual sight-singing and mental age based upon 107 cases to be only .1532. "Since the coefficient approaches zero, it is reasonable to suppose that children of superior intelligence need not be expected to excel in sight-singing. For the same reason, those who show superior ability in singing may be quite below the average in intelligence. Ruch in his study of junior high school pupils at the University of Oregon, found low correlations between intelligence and Courtis addition (.32) and Ayres spelling (.22); whereas, fairly high correlations were found in Stone reasoning (.65) and Gregory language (.62). In spelling and sums, intelligence influences achievement but little, but in arithmetic reasoning and language, intelligence is a conditioning factor." (15)

## A. KNOWLEDGE TESTS

Most of the musical achievement tests belong to the knowledge type. Some measure knowledge of musical notation and elementary theory, others measure ear training and auditory imagery. None of these tests involve musical performance on the part of the subject, although the cognitive processes which underlie performance are measured. Such subjects as harmony, counterpoint and composition have not yet been measured by standardized tests.

*Beach Standardized Music Tests.*<sup>3</sup>—This pioneer musical accomplishment test in the field of public school music was constructed in 1920. The test was designed to measure:

1. Knowledge of essential facts of musical notation.
2. Ability to hear and distinguish the component parts of music, namely, the elements of time and tune both in isolated form and in melodies.
3. Aural recognition of the structural elements of music fundamentally necessary for intelligent appreciation.
4. Pitch discrimination.
5. Musical memory.
6. Sight-singing through indirect method.
7. The writing of music.

*Music Achievement Tests.*<sup>4</sup>—The next achievement test made its appearance in the following year. It consists of two forms, of equal difficulty. Form A and B measure the following:

- Test 1. Assigning titles to compositions played by the examiner.
- Test 2. Detecting changes in (a) pitch, (b) metre, (c) key signature and (d) metre-signature.
- Test 3. (a) Writing key-signatures, (b) locating "la" in 6 different keys, (c) the use of accidentals, (d) knowledge of note values, (e) knowledge of time signatures, and (f) transposition of a G clef phrase to the bass clef.
- Test 4. A multiple response test of 15 questions covering instrumentation, theory, history, and harmony.
- Test 5. Recognition of compositions from notation.

<sup>3</sup> Bureau of Educational Measurements and Standards, Kansas State Normal School, Emporia, Kansas.

<sup>4</sup> Glenn Gildersleeve, 1921.

*Kwaltwasser-Ruch Test of Musical Accomplishment.*<sup>5</sup>—The test measures knowledge of school music from the fourth to the twelfth grade inclusive. Before its construction a thorough analysis of the most representative courses of study in music was made, for the purpose of ascertaining the exact nature of the materials to be included in such a test. Ten subjects were derived from this study and separate tests were formulated to measure every subject individually. The tests are:

1. Knowledge of musical terms and symbols.
2. Recognition of syllable names from notation.
3. Detection of pitch errors in the notation of a familiar melody.
4. Detection of time errors in the notation of a familiar melody.
5. Knowledge of the pitch or letter names of bass and treble clef.
6. Knowledge of time signatures.
7. Knowledge of key signatures.
8. Knowledge of note values.
9. Knowledge of rest values.
10. Recognition of familiar melodies from notation.

*The Hutchinson Music Tests: No. I.*<sup>6</sup>—This test bears the subtitle "Silent Reading and Recognition." It consists of the musical notation of fragments of 24 musical compositions. The 24 items are divided into 6 groups of 4 lines each. Below each four-line group is found the names of 8 musical compositions, each bearing a different number. Half of the names are right and half are wrong. The child is instructed to place the number of the title in the square preceding the notation.

*Mosher Group Test.*—These tests were constructed for the purpose of studying the relationship existing between group achievement test scores and individual sight-singing scores. Seven achievement tests were devised for this purpose:

1. Information about music including (a) marks of expression, (b) note values, (c) elementary theory and notation, (d) history of music, (e) measure and (f) scansion.
2. Names of keys, scales and chords.
3. Knowledge of time signatures and note values.

<sup>5</sup> Built by the writer and G. M. Ruch. Published by the Extension Division of the State University of Iowa, Iowa City, Iowa, 1924.

<sup>6</sup> Published by the Public School Publishing Co., Bloomington, Ill. Devised by Herbert E. Hutchinson, West High School, Columbus, Ohio, and L. W. Pressey, Ohio State University.

4. Silent reading or the recognition of familiar songs from notation.
5. Writing tonal figures from sound, eliminating the time element.
6. Writing rhythmic problems from dictation.
7. Writing musical notation, in which the problems of Test 5 and Test 6 are combined.

*Torgerson-Fahnestock Tests.*<sup>7</sup>—Part A tests theoretical knowledge; such as knowledge of note and rest values, time signatures, pitch and syllable names, marks of expression, repeat bar, slur, major and minor key signatures, natural and harmonic minor scales, etc. Part B tests ear training proficiency and consists of 4 tests; namely,

1. Writing of syllable names of 12 exercises from oral dictation.
2. Writing time signatures and supplying bars for incomplete notation of 4 given melodic fragments.
3. Detecting both pitch and time errors in notation.
4. Writing notes on the staff from dictation.

*Kwalwasser Test of Musical Information and Appreciation.*<sup>8</sup>—This test measures factual knowledge of music and is intended for use in high schools and colleges where music appreciation courses are offered. It consists of 9 separate tests:

1. Classification of artists.
2. Nationality of composers.
3. Composers of famous compositions.
4. Classification of composers by types of compositions.
5. General historical and biographical knowledge.
6. Production of tones on orchestral instruments.
7. Classification of orchestral instruments.
8. General knowledge of instrumentation.
9. Knowledge of music structure and form.

#### B. APPRECIATION TESTS

The appreciative state is a very difficult and elusive one to measure and comparatively few tests have been devised to evaluate the æsthetic response to music. The tests that are available at present are not entirely adequate for they measure extraneous traits. The first of these appreciation tests was constructed by Courtis and is known as:

<sup>7</sup> Published by the Public School Publishing Co., Bloomington, Ill.

<sup>8</sup> Published by the Extension Division of the State University of Iowa, Iowa City, Iowa, 1927.



*The Courtis-Standard Research Tests—Recognition of Characteristic Rhythms.*<sup>9</sup>—The test builder defines rhythm "as one of the main elements of music. It is measured motion. Rhythmic motion also occurs in many of the activities of life." He asks the subject to judge from the music played, what life activity is represented. Five items are found in this test. Four descriptive phrases are found in each item such as "on foot, by boat, on skates, and on horseback." The subject listens to the music and is asked to underline the phrase which is suggested by the music.

*Recognition of Mood from Melody.*—Another Courtis test very similar to the one just described. The instructions reveal something of the nature of the test. "Melody is the expression of a thought in music. In this test you will be asked to judge from the music played what John's thoughts were." Item one presents the following choices: (1) going to a circus, (2) becoming a missionary, (3) becoming a policeman, (4) becoming a soldier.

*Scales for Measuring Judgment of Orchestral Music.*<sup>10</sup>—A test which attempts to measure the merits of orchestral music judgment constructed by Louis Mohler and reported by M. R. Trabue. The test was so administered that the person detecting small differences in merit received a high score; one detecting only large differences received a lower score. The relative merits of the 16 compositions were determined by "musicians and other intelligent adults" and were assigned numerical values. These were used as the standard of value.

### C. PERFORMANCE TESTS

Only two tests of musical performance have been constructed. Both measure sight-singing skill and both are individual tests. There is, of course, great need for group sight-singing testing but whether this can be accomplished without recording devices is questionable, however.

*Hillbrand Sight-Singing Test.*<sup>11</sup>—"The test gives the teacher of music a means of determining by precise objective methods the ability of fourth, fifth and sixth grade pupils in the mechanics of sight-singing. Seven uses of the test are listed by the author:

<sup>9</sup> S. A. Courtis, 1807 East Grand Boulevard, Detroit, Michigan.

<sup>10</sup> Educational Psychology, December, 1923.

<sup>11</sup> Test published by the World Book Co., Yonkers, New York.

1. The teacher may know how much her pupils vary in ability.
2. What pupils are musical illiterates.
3. Whether the pupils need special instruction.
4. Whether the pupils of the school are up to standard for their grades as shown by grade norms.
5. How fourth, fifth and sixth grades compare in average ability.
6. What improvement each grade makes in a year.
7. What method of sight-singing produces the best result."

The test is in the form of a four-page folder containing six songs. The pupil is permitted to study the notation for a few minutes and is then asked to sing them without help or accompaniment. The various errors made by the pupils while singing are recorded on a copy of the songs by the teacher. Nine different kinds of errors are possible. These serve as a guide to the teacher in remedial instruction.

*Mosher Test of Individual Singing (15).*—This test consists of 12 exercises involving the more frequently met problems in school music, arranged in order of progressive difficulty as judged by Mosher. Mosher employed 15 expert judges to pass on the accuracy of the singing and used the measure as the unit. This method of judging eliminates the need for repetition which is a form of practice that vitiates the results. This test was not intended for general class-room use, however.

Already a vast literature is available on the subject of tests and measurements in music. The beginnings of a science of vocational and avocational guidance is rapidly making its appearance. It is not the contention of the writer that all the tests in music are reliable or valid, for many are inadequate and unsatisfactory from a statistical and musical standpoint. Nevertheless, testing in music has made considerable progress, and is revealing information that is most significant for music education. Music will profit much by testing, and its meaning and mission will be made more vital and meaningful because of testing.

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## PSYCHOLOGICAL NECROLOGY (1903-1927)

EDWIN G. BORING

*Harvard University*

Recently I spent two hours in the library seeking the date of death of Alfred Lehmann. After many misadventures, I found it finally by looking through the Notes and News of eighty-two separate numbers of the *PSYCHOLOGICAL BULLETIN*. It occurred to me then that a psychological necrology would be useful and that I could find many dates while finding a few. The date of a distinguished person's death is hard to come at; the biographical handbooks take care of the living and do it accurately since the person in question checks his own data. Then, however, he disappears from the handbooks and has presumably died. Births and careers are accessible; deaths in general are not. *American Men of Science* gives deaths of psychologists in two lists by year, but not by month or day, and these lists are very useful. *Wer Ist's* gives similar lists, but the irregularity of its issue, since the interruption by the War, causes many omissions. *Kürschner* gives too few scientists. Other countries present greater difficulties.

Accordingly I have undertaken to list here all the deaths of psychologists that I have been able to find for the last twenty-five years. I have included all deaths of persons classified as psychologists in *American Men of Science*; all persons, except a very few, whose deaths have been noted in the Notes and News of the *PSYCHOLOGICAL BULLETIN*, which began in 1904; and persons with obituaries or biographical sketches in the *American Journal of Psychology* for the same dates. I have checked the data for Americans against the necrological notices of the Year-Books of the American Psychological Association since 1914, when the Year-Books began; this source adds additional data but no new names. In many cases my own private notes have aided.

The resulting list of 116 names is of course complete for no definable group. It is practically complete for American psychologists of this quarter century and also includes some philosophers, biologists, and psychiatrists. The foreign list includes only the names of men important enough for mention in America. Had there been in Ger-

many the equivalent of the *PSYCHOLOGICAL BULLETIN* the list could have been greatly extended. As it is 62 names are of foreigners and 54 of Americans.

I am confident that these data are quite accurate as to year and place, though of course I can not be certain when I have had but a single source. In general they are accurate as to month but not as to the day of the month. It is astonishing how many different days are given. Binet's death, for example, is given in different places as October 11, 18 and 19, 1911. My practice has been to prefer biographical sketches or notes compiled after an interval of time to Notes and News, which are casual and sometimes copied from the press. I think the user of this list may assume that ages are either exact or a year beyond the real age. The usual practice seems to be to subtract the year of birth from the year of death, thus giving an excess of a year in half the cases where death comes, in the year, before the birthday. I have looked up all the dates of birth that I could find and have given the age exactly where I knew the birthday and the day of death. In spite of this effort, many small errors must remain, and I offer the list with this apology only because the data are so difficult to obtain.

- ALLIN, ARTHUR, 1903, age 34.  
BAIN, ALEXANDER, Aberdeen Univ., September 18, 1903, age 85.  
BAIRD, JOHN WALLACE, Clark Univ., February 2, 1919, age 50.  
BASTIAN, HENRY CHARLETON, London, November 17, 1915, age 78.  
BEAUNIS, HENRI, Paris, 1921, age 91.  
BENUSSI, VITTORIO, Padua, 1927.  
BERGSTRÖM, JOHN ANDREW, Indiana Univ., 1910, age 43.  
BINET, ALFRED, Paris, October 18, 1911, age 54.  
BRENTANO, FRANZ, Zürich, March 17, 1917, age 79.  
BROUGH, JOSEPH, University Coll., Aberystwyth, December 7, 1928, age 73.  
CHAMBERLAIN, ALEXANDER FRANCIS, Clark Univ., April 8, 1914, age 49.  
CHAPMAN, JAMES CROSBY, Yale Univ., July 15, 1925, age 36.  
CHRYSOSTOM, Manhattan Coll., January 23, 1917, age 54.  
COLVIN, STEPHEN SHELDON, Columbia Univ., July 15, 1923, age 54.  
COWLES, EDWARD A., Worcester, July 25, 1919, age 82.  
DAVIS, NOAH KNOWLES, Univ. Virginia, 1910, age 80.  
DÉJERINE, JULES, Paris, 1917, age 67.  
DÜRR, GEORG ERNST, Bern, 1914, age 36.  
ERINGHAUS, HERMANN, Halle, February 26, 1909, age 59.  
EGGER, VICTOR-EMILE, Paris, 1909, age 61.  
ERDMANN, BENO, Berlin, January 7, 1921, age 70.  
EWALD, JUL. RICHARD, Strassburg, July 22, 1921, age 66.  
EXNER, SIGMUND, Vienna, February 5, 1926, age 79.  
FÉRÉ, CHARLES, Bicêtre, Paris, 1907.



- FISCHER, KUWO, Heidelberg, July 5, 1907, age 83.  
FLOURNOY, THÉODORE, Geneva, November 5, 1920, age 66.  
FOSTER, WILLIAM SILLIMAN, Univ. Minnesota, January 2, 1926, age 37.  
FROST, ELLIOTT P., Rochester Univ., September 3, 1926, age 42.  
FULLERTON, GEORGE STUART, Vassar Coll., March 23, 1925, age 65.  
GALTON, FRANCIS, London, January 18, 1911, age 88.  
GARDNER, HARRY NORMAN, Smith Coll., December 29, 1927, age 72.  
GONDY, J. P., New York Univ., December 31, 1908, age 56.  
GROSS, HANS, Graz, December 9, 1915, age 67.  
HALL, GRANVILLE STANLEY, Clark Univ., April 24, 1924, age 80.  
HARRIS, WILLIAM TORREY, Washington, D. C., 1909, age 74.  
HEILBRONNER, KARL, Utrecht, September 8, 1914.  
HENRY, CHARLES, Paris, November 9, 1926.  
HERING, EWALD, Leipzig, January 26, 1918, age 83.  
HERMANN, LUDIMAR, Königsberg, June 5, 1914, age 75.  
HERRICK, CLARENCE LUTHER, Socorro, N. M., September 15, 1904, age 46.  
HILLENRAND, FRANZ, Innsbruck, 1926.  
HOCH, AUGUST, New York, September 22, 1919, age 51.  
HUDSON, THOMAS JAY, Washington, D. C., 1903, age 69.  
HUXEY, EDMUND BURKE, Hopkins Univ., December 30, 1913, age 43.  
HYSLOP, JAMES HENRY, New York, June 17, 1920, age 75.  
IDE, ARCHIE L., Alfred Univ., February 23, 1923.  
IRONS, DAVID, Bryn Mawr Coll., January 27, 1907, age 37.  
JAMES, WILLIAM, Harvard Univ., August 26, 1910, age 68.  
JEGI, JOHN I., 1904, age 38.  
JODL, FRIEDRICH, Vienna, February 28, 1914, age 64.  
JOHNSTON, CHARLES HUGHES, Univ. Illinois, September 4, 1917, age 39.  
KRÄPELIN, EMIL, Munich, October 7, 1926, age 70.  
KRONECKER, CARL HUGO, Bern, June 5, 1914, age 75.  
KÜLPE, OSWALD, Munich, December 29, 1915, age 53.  
LADD, GEORGE TRUMBALL, Yale Univ., August 8, 1921, age 79.  
LEHMANN, ALFRED, Copenhagen, September 26, 1921.  
LIPPS, THEODOR, Munich, October 17, 1914, age 63.  
LOEB, JACQUES, Rockefeller Inst., February 11, 1926, age 64.  
MACH, ERNST, Vienna, February 19, 1916, age 78.  
MAGNAN, VALENTIN-JACQUES-JOSEPH, Paris, 1916, age 81.  
MARSHALL, HENRY RUTGERS, New York, May 2, 1927, age 75.  
MARTIUS, GÖTZ, Kiel, 1927, age 74.  
MEINONG, ALEXIUS VON, Graz, November 27, 1920, age 67.  
MERCIER, C. A., 1919.  
MEUMANN, ERNST, Hamburg, April 26, 1915, age 52.  
MILLS, THOMAS WESLEY, McGill Univ., 1915.  
MINOT, CHARLES SEDGWICK, Harvard Univ., November 19, 1914, age 71.  
MOORE, KATHLEEN CARTER, Media, Pa., July 24, 1920, age 54.  
MOTORA, YUZERO, Tokio, December 13, 1912.  
MÜNSTERBERG, HUGO, Harvard Univ., December 16, 1916, age 53.  
MUSCIO, BERNARD, Univ. Sydney, May 28, 1926, age 39.  
NACCARATI, SANTE, Columbia Univ., August 12, 1926.

- NAGEL, WILIBALD A., Rostock, 1910, age 40.  
NAKASHIMA, TAIZO, Waseda, 1919.  
NORSWORTHY, NAOMI, Columbia Univ., December 25, 1916, age 39.  
NOYES, WILLIAM, Boston, October 20, 1915, age 57.  
PAULSEN, FRIEDRICH, Berlin, August 15, 1908, age 62.  
PECKHAM, GEORGE WILLIAMS, Milwaukee, 1914, age 69.  
PELMANN, CARL G., Bonn, December 21, 1916, age 78.  
PICK, ARNOLD, Prague, 1924, age 75.  
PIERCE, ARTHUR HENRY, Smith Coll., February 20, 1914, age 46.  
PUTNAM, JAMES JACKSON, Harvard Univ., November 4, 1918, age 72.  
QUANTZ, JOHN O., 1903, age 35.  
QUARLES, JAMES ADDISON, Washington and Lee Univ., 1907, age 70.  
READ, MELBOURNE S., Colgate Univ., 1927, age 58.  
RIBOT, THEODORE ARMAND, Paris, December 8, 1916, age 76.  
RICE, DAVID E., New York, September 24, 1926, age 50.  
RIVERS, W. H. R., Univ. Cambridge, June 4, 1922, age 58.  
ROYCE, JOSIAH, Harvard Univ., September 14, 1916, age 60.  
RUSSELL, JOHN E., Williams Coll., February 25, 1917, age 69.  
SALMON, THOMAS WILLIAM, New York, August 13, 1927, age 51.  
SANFORD, EDMUND CLARK, Clark Univ., November 22, 1924, age 65.  
SCHAUYEAU, A., Paris, 1917, age 89.  
SCHRÖDER, CONRAD, Giessen, September 5, 1914.  
SCHULE, H., 1917, age 76.  
SCOTT, COLIN ALEXANDER, Mt. Holyoke Coll., 1925, age 64.  
SIDIS, BORIS, Sidis Inst., October 25, 1923, age 56.  
SIGWART, CH., Tübingen, August 6, 1904.  
SMITH, THEODATE LOUISE, Clark Univ., February 16, 1914, age 53.  
SMITH, WALTER, Lake Forest Univ., January 10, 1907, age 37.  
SOUTHARD, ELMER ERNEST, Harvard Univ., February 8, 1920, age 43.  
SPENCER, HERBERT, London, December 8, 1903, age 83.  
SULLY, JAMES, London, 1923, age 81.  
TANNERY, M. PAUL, Paris, November 27, 1904.  
TAYLOR, C. O., Pratt Inst., April, 1922.  
TEICHENER, EDWARD BRADFORD, Cornell Univ., August 3, 1927, age 60.  
TYLOR, EDWARD BURNETT, Oxford Univ., January 2, 1917, age 84.  
VASCHIDE, N., Paris, 1907.  
WAGNER, TH., Germany, July 6, 1913.  
WARD, JAMES, Cambridge Univ., March 4, 1925, age 82.  
WATT, HENRY J., Glasgow, October 25, 1925, age 46.  
WAYENBURG, G. VAN, Amsterdam, May 18, 1926.  
WERNICKE, CARL, Halle, June 15, 1905.  
WITASEK, STEPHAN, Graz, 1915.  
WOLFE, HARRY KIRKE, Univ. Nebraska, July 30, 1918, age 59.  
WUNDT, WILHELM, Leipzig, August 31, 1920, age 88.  
WYLIE, H. H., Geneva Coll., June 10, 1923, age 43.  
ZELLER, EDUARD, Berlin, March 19, 1908, age 94.

## BOOKS RECEIVED

H. ADDINGTON BRUCE, *Your Growing Child. A Book of Talks to Parents on Life's Needs.* N. Y.: Funk & Wagnalls, 1927. Pp. xii+405.

HELEN D. WHIPPLE, *Making Citizens of the Mentally Limited. A Curriculum for the Special Class.* Bloomington: Public School Pub. Co., 1927. Pp. vi+374.

H. A. OVERSTREET, *About Ourselves. Psychology for Normal People.* N. Y.: Norton, 1927. Pp. 300.

H. CLAY SKINNER, *Psychology for the Average Man.* Boston: Badger, 1927. Pp. 119.

MAX EASTMAN, *Marx and Lenin. The Science of Revolution.* N. Y.: A. & C. Boni, 1927. Pp. 267.

CAVENDISH MOXON, *Freudian Essays on Religion and Science.* Boston: Badger, 1926. Pp. 133.

EDOUARD LE ROY, *L'Exigence Idealiste et Le Fait de l'Évolution.* Paris: Boivin, 1927. Pp. xvii+270.

FRITZ KELLERMANN, *The Effect of the World War on European Education.* Cambridge: Harvard Univ. Press, 1928. Pp. xiii+89.

STUART M. STOKE, *Occupational Groups and Child Development. A Study of the Mental and Physical Growth of Children in Relation to Occupational Grouping of Parents.* Cambridge: Harvard Univ. Press, 1927. Pp. 92.

MURRAY W. BUNDY, *The Theory of Imagination in Classical and Mediaeval Thought.* University of Illinois Study in Language and Literature. Urbana: 1928. Vol. XII, No. 2-3. Pp. 289.

FREDERIC W. JONES and STANLEY D. PORTEUS, *The Matrix of the Mind.* Honolulu: Univ. Press Assn., 1928. Pp. 457.

ORLIE M. CLEM, *A Work Book Syllabus in Principles of Education.* Baltimore: Warwick & York, 1928. Pp. 170.

CHRISTIAN A. RUCKMICK, *The Mental Life. A Survey of Modern Experimental Psychology.* N. Y.: Longmans, Green, 1928. Pp. x+253.

J. O. CHASSELL, *The Experience Variables. A Study of the Variable Factors in Experience Contributing to the Formation of Personality.* Rochester: Univ. of Rochester Medical School, 1928. Pp. 41.

## NOTES AND NEWS

THE third annual meeting of the Midwestern Psychological Association will be held at the University of Wisconsin, Madison, Wisconsin, on Friday and Saturday, May 11-12, 1928. Sessions will be held on Friday afternoon and evening and on Saturday morning and afternoon. On Saturday evening will be held the annual dinner and the address of the President, Professor A. R. Gilliland of Northwestern University. Besides the presentation of experimental papers and informal conferences, the program includes a discussion of the problem of insight, the problem of the elementary course in psychology, and a symposium on learning. Professor Samuel Renshaw, Ohio State University, Columbus, Ohio, is secretary of the association.

PROFESSOR MARY W. CALKINS, professor of psychology in Wellesley College, during December gave two lectures at Bedford College, University of London, on "Conceptions of Meaning" and "The Nature and Types of Value." Dr. Calkins also read a paper before the British Psychological Society on "Self Psychology."

DR. JOHN A. MCGEOCH, of Washington University, has been appointed acting professor of psychology for the summer session of 1928 at the University of North Dakota.

DR. KARL BÜHLER, of the University of Vienna, who was visiting professor of psychology at the Johns Hopkins University during the first semester, is lecturing at Harvard University during the second semester of this year.

DR. MADISON BENTLEY, of the University of Illinois, has been appointed Sage professor of psychology at Cornell University to occupy the chair held for nearly thirty-five years by the late Edward Bradford Titchener.

DR. J. ARTHUR GLAZE, instructor in psychology at the University of Michigan, has been elected head of the department of psychology and professor of psychology at Texas Christian University, Fort Worth, Texas. This school has recently come into possession of a large endowment, chief of which are oil-producing lands in the

western section of the state. A modern laboratory of psychology is the aim for the next three years.

THE Training School at Vineland, New Jersey, offers each year a limited number of research fellowships in abnormal and clinical psychology to students of recognized ability who have majored in psychology. These fellowships are for one academic year and provide (1) living at the institution, (2) instruction and experience in all phases of clinical psychology, and (3) opportunity for independent research in abnormal and clinical psychology. Many research fellows have received graduate credit at leading universities for work at Vineland. Excellent facilities are provided for research studies of M.A. and Ph.D. calibre. The Training School also invites consideration of its research facilities by professional psychologists of repute who might desire to utilize these research facilities for themselves or for their graduate students. Inquiries may be addressed to Mr. E. R. Johnstone, Director of the Training School, or to Dr. Edgar A. Doll, Director of Research.

A CONFERENCE on Experimental Psychology was held on Friday and Saturday, March 30 and 31, at Carlisle, Pa., under the auspices of the Division of Anthropology and Psychology of the National Research Council. Thirty psychologists were present, invited by the Division, representing as many laboratories, and picked from the ranks of those actively engaged in experimental work. The general situation in laboratory psychology was canvassed, and unanimous recommendation made that the National Research Council establish in the Division a Committee on Experimental Psychology which shall attempt to obtain and administer funds for the advancing of experimental research along lines of promotion which were approved by the Conference. Recommendation was also made that the Division call next year a Conference of editors and managers of psychological journals, with such other persons as may be deemed advisable, to consider the problems of publication. The minutes of this Conference will shortly be available, and copies will be sent to the Directors of all psychology laboratories.

AN International Congress of Applied Psychology will be held in Paris in October, 1928. Address the Secretary-General, M. Paul Masson-Oursel, Directeur d'Études à l'École des Hautes Études, Paris, France, for information.



